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Risk Management: An Integral Part of Operational Planning

By

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A proposal submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Joint Military Operations Department.

The contents of this proposal reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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15. Abstract:

Clausewitz' premise that War is politics by another means, dictates that the success of any military operation requires that both military and political objectives be achieved. Joint Planning provides the optimum course of action to the war-fighting Commander in Chief (CINC) and Joint Task Force (JTF) Commander to achieve military objectives. Risk Management (RM) is a five-step process that identifies hazards, assesses risks and implements controls to reduce risks to an acceptable level. While RM methodology is being merged into joint doctrine publications, how RM should be applied in the Joint Planning and Execution System (JOPES) has not been adequately articulated. Infusing RM methodology in the JOPES and the Commander's Estimate of the Situation (CES) results in risk-based planning that refines Courses of Action (COAs) to achieve military objectives while minimizing losses of combat power.

This paper illustrates how RM fits into the JOPES and the CES process and shows staff planners how to maximize force protection in every COA presented to the CINC or JTF Commander within the existing planning process.

The paper recommends (1) updating RM terminology in the Joint Doctrine Encyclopedia, (2) addressing RM in joint history publications, (3) conducting RM analyses on all tasks in the Universal Joint Task List (UJTL), (4) incorporating RM in the User's Guide for the JOPES, (5) capturing and controlling risks during the planning process, and (6) ensuring operational schemes and campaign plans do not overshadow hazards within the COAs.

RM rules derived from historical cases include: (1) Risk is present in all military operations. (2) Accept no unnecessary risks. (3) Risk can be reduced, accepted, avoided, distributed, and/or transferred. (4) Risk associated with the COA should be communicated up the chain of command so that a proper risk decision can be made at the appropriate level. (5) Successful RM achieves its objective.

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Introduction to Risk Management

> The higher up the chain of command, the greater is the need for boldness to be supported by a reflective mind, so that boldness does not degenerate into purpose less bursts of blind passion. Command becomes progressively less a matter of personal sacrifice and increasingly concerned for the safety of others and for the common purpose.[1] (Carl von Clausewitz)

Clausewitz' premise that War is "a continuation of political intercourse, carried on with other means,"[2] dictates that the success of any military operation requires that both the (1) military objectives be properly identified and achieved and (2) the political objectives be properly identified and achieved.[3] Joint Planning provides the optimum course of action (COA) to the war-fighting Commander in Chief (CINC) and Joint Task Force (JTF) Commander in order to attain military objectives. This optimum COA applies the best mix of forces to counter the enemy center(s) of gravity at the decisive point and prevents the culmination of friendly forces. Risk Management (RM) is a five-step process that identifies hazards, assesses risks and implements controls to reduce risks to an acceptable level.[4] Infusing RM methodology in the Joint Planning and Execution System (JOPES) and the Commander's Estimate of the Situation (CES) results in risk-based planning that refines COAs to achieve military objectives while minimizing losses of combat power. **This paper will illustrate how RM fits into the JOPES and the CES process and shows staff planners how to maximize force protection in every COA presented to the CINC or JTF Commander within the existing planning process.**

All decisions are crossroads between competing courses of action; each characterized by uncertain benefits and associated costs. OPLANS and OPORDS are decisions on the employment of combat forces made by operational commanders. These operational decisions differ from other decisions in two ways. First of all, operational decisions are made in the complex and dynamic

environment of war or military operations other than war (MOOTW). This fog of war is made up of ambiguity, uncertainty and friction. Lack of information causes uncertainty. The difference between perception and reality is ambiguity; and the constant resistance caused by internal and external forces operating in a dangerous environment creates friction.[5] Second, operational decisions must stand up to the tests of feasibility, adequacy, and acceptability. Feasibility means that a COA is executable, with resources available, in the face of heavy enemy opposition, within the constraining environment. Adequacy means that a COA can independently accomplish all the military objectives while complying with a superior's guidance. Acceptability means that expected gains not only exceed, but also are worth the expected losses.[6]

Risk management is derived from the principle of security, common to both the principles of War[7] and principles of MOOTW.[8] Security precludes the enemy from gaining an unexpected advantage over friendly forces through proactive staff planning and prudent application of force protection measures.[9] Security preserves freedom of action and combat power, reduces vulnerability and complacency, and promotes the inherent right of self-defense from hostile acts and hostile intent.[10] In operational decision-making, the greater hazards threatening lives and losses to combat power require optimum management of risk.[11]

Purpose of Applying Risk Management into Joint Planing

> Everyday as we respond to the nation's needs, we expose our soldiers to hazards in uncertain and complex environments. We do this with the full knowledge that there are inherent risks associated with any military operation. The nature of our profession will not allow for either complacency or a cavalier acceptance of risk.[12] (General Dennis J. Reimer, Chief of Staff of the Army)

Army personnel losses, caused by accidents and friendly fire, exceeded combat casualties in all 20th century wars except for the Korean war, as shown in Table (1). This statistic justifies

the need for applying RM in operational planning. Even as recently as Operation Desert Shield and Operation Desert Storm over 50% of accidents (not enemy action) caused naval aviation aircraft and aircrew losses.[13] It is understood that the amount of risk taken in war should be greater than the amount of risk taken in peace, but no risk should be taken unnecessarily. RM optimizes the planning process to maximize benefits and minimize losses. It is the five step decision making process for identifying hazards, assessing hazards, identifying risk controls, making a risk decision and monitoring the controls during execution (illustrated in Table (2).[14] The goal of this process is to maximize mission accomplishment while reducing risk to an acceptable level.

Operational Risk Management (ORM) is therefore, applying this same decision-making process to operational level decisions. ORM is not a new concept. It is described in Naval Doctrine Publication 1, Naval Warfare:

> Risk management and risk assessment are formal, essential tools of operational planning. Sound decision making requires the use of these tools both in battle and in training. Naval commanders evaluate risk by using combinations of real-time, deliberate, and in-depth assessments to determine the cumulative effect on the mission and seek ways to eliminate or control unnecessary hazards to their forces...carefully identifying the risks, analyzing and controlling as many factors as possible, and executing a supervised plan that accounts for these factors have contributed to the success of some of the greatest military operations in history.[15]

General Dwight Eisenhower, the Supreme Commander, Allied Expeditionary Forces, during World War II, delayed the invasion of Normandy by twenty-four hours because the risk of low cloud ceilings and no air cover was greater than the advantage of surprising the enemy. By applying RM, he successfully delayed the precise employment of 5,000 ships, 11,000 aircraft and 700,000 men in a decisive operation in the war.[16]

Joint Doctrine is rapidly incorporating risk management. The 17th meeting of the Joint Doctrine Working Party (JDWP) in April 1996 identified the need to standardize joint doctrine for RM in joint operations.[17] By the 18th meeting of the JDWP in October 1996 the decision to incorporate RM in appropriate joint publications was approved.[18] Today, RM has been incorporated into the Joint Task Force Commander's Handbook for Peace Operations, Joint Publication 3-0: Doctrine for Joint Operations, and Joint Publication 3-13.1: Joint Doctrine for Command and Control Warfare. Forthcoming revisions to joint publications that will merge RM into joint doctrine include Joint Publication 5-0: Doctrine for Planning Joint Operations, Joint Publication 5-00.1: JTTP for Campaign Planning, and Joint Publication 5-00.2: Joint Task Force Planning Guidance and Procedures.[19] Also, the Joint Military Operations Department of the Naval War College incorporated a discussion of RM in the September 1998 printing of one of its capstone training documents, NWC 4111C, the "Commander's Estimate of the Situation (CES)."[20] While RM is permeating many of our joint publications, neither a comprehensive listing of RM terminology, compiled in Appendix A, nor a discussion on how RM fits into the JOPES, addressed in Table (5), has been incorporated into the Joint Doctrine Encyclopedia[21]. While RM is not a revolutionary concept, how and where this decision making process optimizes joint planning must be better understood by staff planners.

Risk Management in the Joint Operation Planning and Execution System (JOPES)

> Risk Management is not an add-on feature to the decision-making process, but rather a fully integrated element of planning and executing operations...Risk management helps us preserve combat power and retain the flexibility for bold decisive action. Proper risk management is a combat multiplier that we can ill afford to squander.[22] (General Denis J. Reimer, Chief of Staff Army)

At the strategic level, the Deliberate Planning Process (DPP) is geared to produce an executable OPLAN that is acceptable, feasible and adequate and conforms to joint doctrine. The product of the Crisis Action Planning Process (CAP) is to produce an executable OPORD that complies with the same criteria.[23] The deliberate and crisis action planning processes are very similar. The DPP prepares against future crises while the CAP counters current crises and requires an additional Execution Phase to resolve the crisis.

In **Phase I (Initiation or Situation Development Phases)** of both the DPP and CAP, hazards associated with the fundamental assumptions and major tasks are identified. Due to the differences in planning time between the DPP and the CAP, the number of preliminary hazards identified will vary. The principal factors affecting the probability of military success or failure are (1) the executability of the **mission**, (2) the capabilities and readiness of the **enemy**, (3) the challenge of the tactical environment or **terrain**, (4) the capabilities and readiness of our own **troops**, and (5) the **time** available for planning and execution. By conducting a comprehensive METT-T analysis in **Phase II (Concept Development or Crisis Assessment)** of both joint planning processes, a comprehensive number of critical hazards can be identified.[24] These hazards are associated with operational factors, critical factors, operational functions, principles of war, and principles of MOOTW as shown in **Tables (3) and (4)**. Once identified, the hazards are assessed in terms of probability and severity where "the risk of any event, therefore, can be more usefully thought of as the product of (1) the probability of that event occurring, and (2) the cost associated with the event occurring."[25] In **Phase III (Plan Development or COA Development)** of the Joint Planning Processes, risk controls are identified and incorporated into COAs and tested for feasibility, acceptability and adequacy. **Phase IV (Plan Review or COA**

Selection) is where risk decisions are made. In this phase, COAs are war-gamed against enemy most likely and most probable courses of action (ECOAs) comparing the benefits and costs of each COA against opposing ECOAs. COAs are repeatedly modified to mitigate risk until the military level of risk the CINC is willing to bear, at the different locations and times, on the battlefield are acceptable to him. The plan is then briefed to the NCA and further refined until the political rewards outweigh the political risks the NCA is willing to bear. In **Phase V (Supporting Plans or Execution Planning)** of the Joint Planning Process, subordinate and supporting plans are created, risk controls are incorporated into the OPLAN or OPORD and the residual risk is determined. In the **final Phase of the CAP (Execution)** the NCA authorizes the CINC to execute the OPORD or campaign plan. The staff monitors the execution paying close attention to the areas with highest residual risk, implementing additional controls "on the run" if necessary. **Table (5)** illustrates how the Joint Deliberate and Crisis Action Planning Processes incorporate RM.[26]

Risk Management in the Commander's Estimate of the Situation (CES)

> And for this reason, the wise general in his deliberations must consider both favourable and unfavourable factors. [Ts'ao Ts'ao] He ponders the dangers inherent in the advantages, and the advantages inherent in the danger. By taking into account the favourable factors, he makes his plan feasible, by taking into account the unfavourable factors, he may resolve the difficulties.[27] (Sun Tsu)

At the operational level of war, the CINC, JTF Commander and their subordinate Commanders conduct Crisis Action Planning where the Commander's Estimate of the Situation (CES) becomes the critical step in OPORD development. The CES outlines the COAs from which the JTF commander will select the one that best allows him to preserve combat power and

maximize its application at the decisive point. **Table (6)** visually depicts how RM is merged into the JTF Planning Process as well as the CES.

Upon **Mission Receipt**, the JTF staff will identify preliminary hazards by outlining the major tasks in the operation and listing all of the hazards and their respective causes. The first phase of the CES is **Mission Analysis,** where Mission, Commander's Intent, Objectives, Purpose, Constraints, Restraints and Assumptions are defined and documented. The Commander's Intent includes the purpose, method and endstate the commander is trying to produce and should not address acceptable risk. Risk is specified in the commander's guidance and is incorporated within all courses of action.[28] Rather than precipitating a misunderstanding of how much risk is acceptable to the commander, the amount and location of the risk that the commander is willing to bear is embedded in the COA he selects. During Mission Analysis, the factor analysis of Time, Space and Force is conducted to identify the second list of hazards that may require management. Mission analysis concludes with a preliminary test for adequacy to ensure sufficient forces and combat power is available to accomplish the mission.

During **COA Development,** friendly and enemy critical factors, including objectives, critical strengths, critical weaknesses, critical vulnerabilities, and decisive points are analyzed. Critical factor analysis is the third step in identifying possible hazards because enemy critical strengths may be hazardous to our critical weaknesses or critical vulnerabilities, especially if they can be amassed at the decisive point. During this step, COAs are refined to include the operational functions of operational command and control, intelligence, fires, logistics, and protection. Hazards to operational functions become the fourth category of hazards to the mission that are listed for subsequent assessment. Principles of war and principles of MOOTW

are also applied, if required, to refine the COAs. Hazards to these principles become the fifth listing of hazards to the mission. The mission analysis phase is completed with test for feasibility and acceptability. The feasibility test ensures that each COA can by itself accomplish all the military objectives. During the preliminary acceptability test, hazards identified during mission receipt, operational factor analysis, critical factor analysis, operational function analysis, principles of war and principles of MOOTW analysis are assessed. Acceptability is evaluated by rating the hazards in terms of probability and severity using the matrix shown in Tables A1 through A3. Probability means how likely is the chance of occurrence of the damage. Severity means, if the damage occurs, how detrimental will it be to the mission. Not all hazards are controlled-- only those impacting the remaining COAs available to the CINC.

The next phase in the JTF planning process is **COA Analysis,** where COAs are analyzed against opposing ECOA, using objective based measures of effectiveness (MOE). After weighing COAs against their hazards, risk decisions are made to control the risks identified in the preliminary acceptability test. If benefits outweigh the risk, the mission is performed. If risks outweigh the benefits, controls are implemented. Controls are initially instituted against the most serious hazards in order to reduce the risks to an acceptable level.

After the final feasibility and acceptability tests are conducted, the COAs are compared using the commander's weighted governing factors to discern the advantages, disadvantages, and merits of remaining COAs. At this point the JTF Commander selects the optimum COA and submits it to the CINC and NCA for **COA Approval**. After modifying the COA to reflect CINC and NCA recommendations, the JTF Commander tasks his staff with **Orders Production**, ensuring risk control measures are included in the OPORD.

Rehearsal is conducted to verify the force is ready and hazards reduced to an acceptable level. During **Execution and Monitoring**, hazards with the highest residual risk are monitored to maximize protection of combat power. Monitoring your decision is the last step in the ORM process and is nothing more than good old fashion supervision to ensure the controls in place are having the desired effect.

RM is neither a barrier to mission accomplishment nor a revolutionary concept. It is logical, systematic planning. The purpose of applying RM to the CES is not to eliminate all hazards, but to manage battlefield risks, achieve military objectives, and minimize losses.[29]

Real World Application of Operational Risk Management

> Increasingly we have moved away from the attitude of accomplish the mission at any cost to one of weighing benefits versus risk, making risk management decisions, and accomplishing the mission at reduced costs.[30]
> (General Ronald R. Fogleman, Chief of Staff Air Force)

We cannot adopt Napoleon's recommendation that the best strategy is to "be strong everywhere."[31] Due to scarcity of resources and a need to mass combat power at the decisive point, not all the hazards identified on the battlefield and shown on the Risk Identification Matrix, Table (3) can be controlled. Only those hazards identified that significantly impact potential COAs can be managed. Real world case studies show how prudent RM application helped commanders anticipate hazards, preclude excessive combat losses, increase operational readiness, and achieve military objectives. Flawed RM produced unsatisfactory results. The following historical accounts illustrate RM lessons that can help joint planners produce acceptable COAs.

Falklands-Malvinas Campaign (2 Apr 1982 – 15 June 1982)

In his memoirs, One Hundred Days, Admiral Sandy Woodward, the British Task Force Commander during the Falkland-Malvinas Campaign selected an amphibious assault COA on the

islands to avoid jeopardizing his lines of communication and sustainment during a South Atlantic winter.[32] Hazards affecting the amphibious assault COA could have been captured within a Risk Identification Matrix similar to Table (7), in order to apply resources against the most risky or dangerous hazards. Admiral Woodward described one of his two highest risks and critical vulnerabilities by saying "If the carriers had been sunk or even badly damaged we would have lost it all there and then, with no decks there would be no aircraft at all rather than too few."[33] The hazard to *HMS Invincible* and *HMS Hermes* was **avoided** by operating the two carriers further east, outside the range of enemy Mirages and A-4's. This action gave up total air superiority for local air superiority.[34] He described his second critical vulnerability of the landing force by writing, "...almost all of these eggs were soldiers, more than fifteen hundred of them, and every one in the big white painted basket of the liner Canberra,[35] which had no defense system and poor fire-fighting capability. This hazard was **distributed** among two additional ships, by cross-decking the troops by boat and helicopter, under harrier close air support, while located in the far eastern offshore staging area.[36] The Task Force Commander discussed another demoralizing hazard, "As far as I could see, one of our main problems was that of the dreaded 'Blue-on–Blue.'"[37] This hazard was **reduced** by constructing simple ROE and creating a fixed wing exclusion box around all British ships, from the surface up to 10,000 feet. Within the box, all fixed wing aircraft would be engaged. Fixed wing aircraft trying to escape from the box would be intercepted by friendly air.[38] The submarine threat and threats to the base of operations would be **avoided** by staying far away from the Port Stanley area and maintaining the staging areas far offshore to the East. The threat from the Argentine surface fleet would be **transferred** to friendly submarines, which were judiciously placed as insulating buffers to the Task Force.[39] Admiral

Woodward believed weather to be one of the most serious hazards to the amphibious landing but stated, "The vagaries of the weather have always bedeviled military commanders and I too must **accept** the element of uncertainty."[Emphasis added][40] **The first rule about managing risk is that it can be "accepted, reduced, avoided, distributed, and/or transferred."[41]**

Operation El Dorado Canyon (15 April 1986)

In response to the killing of five Americans during simultaneous terrorist attacks on the Rome and Vienna airports (27 December 1985) and the bombing death of four Americans aboard TWA flight 840 (2 April 1986), President Reagan imposed an international embargo and directed two Freedom of Navigation exercises against Libya.[42]Nevertheless, Libya continued undeterred and on 5 April 1986, President Qaddafi publicly backed a bomb attack at the La Belle Nightclub in Berlin, resulting in 3 more deaths and 229 injuries, including 79 Americans. The U.S. responded with Operation El Dorado Canyon, a preemptive air strike against five command and control, guerilla training and support installations. The purpose of the airstrike was to counter President Qaddafi's public declaration of state sponsored terrorism.[43] One of the greatest risks to this operation was the possibility of capture and parading of downed aircrews on international television. To reduce this risk, the strike was planned and rehearsed to minimize hazards to participating aircraft. "That was a natural act of self preservation as well as a recognition that the loss of a single aircraft, the capture of a single pilot would give Qaddafi an excuse to claim victory."[44] While one F-111 aircraft was lost at sea, no aircrews were shot down or captured averting a strategic and political failure of the mission[45] **"The successful planning and execution of this mission illustrates a second RM rule. "The mission is paramount, but not at all costs."[46]**

USS Kennedy and USS Independence airstrikes on Beirut (4 Dec 1983)

In response to SA-7 missiles fired on a routine reconnaissance flight over Beirut on 3 December 1983, the NCA tasked the *Kennedy* and *Independence* Battlegroups to conduct preemptive strikes against the anti-aircraft artillery (AAA) batteries and their respective power junctions at daylight the next day. The risk of collateral damage in using the Battleship *New Jersey's* 16-inch Guns without a forward spotter was avoided in favor of precision air strikes.[47] However, insufficient planning time was not communicated up the chain of command as one of the greatest risks in conducting a successful air strike. Additionally the chain-of command was not appraised of the change in battlegroup readiness posture from a four-hour alert down to a twenty-four hour alert. As a result, air strikes were directed and launched prematurely resulting in the unnecessary loss of two aircraft and aircrew. "The fundamental error was not giving those involved the time they needed to prepare the mission for minimum risk and maximum effectiveness."[48] **A third RM rule is to communicate the most dangerous risks up the Chain of command to ensure proper risk decisions are made at the appropriate level.**

Operation Desert Storm (17 Jan 1991 - February 1991- 28 Feb 1990)

During the land phase of Operation Desert Storm, the coalition forces under Lieutenant General Gary E. Luck, Commander of the XVIII Airborne Corps, and Lieutenant General Frederick M. Franks, Jr., Commander of the VII Corps, were charged with conducting the "left hook" or single envelopment maneuver of the Iraqi Republican Guard (IRG) in the West. This consisted of outflanking the enemy and creating a pocket to reduce opposition forces. Lieutenant General Luck was tasked with sealing the IRG escape route through the highway connecting Baghdad and Basra while Lieutenant General Franks' objective was to engage and destroy the

IRG.[49] General Franks perceived one of the greatest risks to mission accomplishment was loss of synchronization.[50] His concern grew when the operation was launched fifteen hours ahead of schedule and before his fuel trucks were prepositioned along the line of operations of his advancing tanks.[51] After initially penetrating enemy lines, General Franks elected not to conduct a night breach to avoid (1) the risks of employing forces which had never trained to conduct such an operation, (2) the danger of having forces get out of formation in the darkness and (3) the hazard of bypassing an enemy tank unit, which could wreak havoc on friendly fuel supply lines.[52] While prudent in managing the above hazards, General Franks sacrificed speed of maneuver, abandoned the objective and the failed to discern additional dangers caused by the lack of time necessary to complete the decisive maneuver. In his CES, General Franks believed it would take him eight days to complete the maneuver.[53] Unbeknownst to him, eight days would double the time period the 100 hour ground war would actually last. All these factors were embedded in Gen Franks' obsession with maintaining ordered battle lines and synchronization as the driving scheme of maneuver.[54] In addition, General Franks did not pay attention to unity of command and match the tempo and momentum of General Luck's forces, whose lead unit, the 24th Mechanized Infantry Division, had to be slowed down for 48 hours to allow the VII Corps to catch up.[55] The failure to achieve the objective permitted four and one half of the seven IRG to escape through the back door and take refuge in Iraq, taking with them 700 tanks and much of their equipment.[56] **The RM lessons in this historical example are twofold: (1) Hazards associated with COAs should not be ignored when combined into a synchronized scheme of maneuver and (2) Successful RM achieves its objective.**

Conclusions/Recommendations/Lessons Learned:

While RM methodology is being merged into joint doctrine publications, how RM should be applied in the JOPES has not been adequately articulated. Several hurdles need to be overcome before RM implementation, in the joint planning process, achieves military objectives and maximizes resource protection. First of all, the Joint Doctrine Encyclopedia must standardize RM terminology and RM process definitions as proposed in Appendix A. Second, specific discussion of how risks were mitigated should be included in all joint history publications including the Joint Military Operations Historical Collection[57], Operation Just Cause – Panama[58], and Operation Urgent Fury – Grenada.[59] The third recommendation results from the fact that the hazards of undertaking a particular COA are at least the cumulative sum of (1) the hazards of conducting individual universal joint tasks (UJT) from the Universal Joint Task List (UJTL) and (2) the interaction the UJT and the operational factors of the battlefield. While the second subset of hazards is situationally dependent, the first set of hazards is specific to the UJT and applies whenever it is undertaken. Commanders responsible for strategic, operational and tactical level tasks should conduct a RM analysis of tasks in the UJTL to identify hazards, assess risks, and publish controls that universally protect forces regardless of where the UJT is conducted. Fourth, the User's Guide for JOPES (Joint Operation Planning and Execution System) should be updated to include a discussion on how RM applies to both the DPP and the CAP as shown in Table (5). Fifth, Staff planners should attempt to capture and quantify all risks that are uncovered during the planning process using Table (4) as a template. This will assist in systematically applying resources to mitigate the most hazardous risks in the COAs available to the commander. Finally,

when COAs are blended into an operational scheme or campaign plan, hazards of contributing COAs should not be ignored in order to preserve operational sequencing or synchronization.

Even before the above recommendations are implemented, staff planner can take away the following lessons: (1) Risk is present in all military operations. (2) Accept no unnecessary risks. (3) Risk can be reduced, accepted, avoided, distributed, and/or transferred. (4) Risk associated with the COA should be communicated up the chain of command so that a proper risk decision can be made at the appropriate level. (5) Successful RM achieves its objective.

ARMY LOSSES DUE TO	WWII 1942-1945	KOREA 1950-1953	VIETNAM 1965-1972	DESERT SHIELD/STORM 1990-1
ACCIDENTS	56%	44%	54%	75%
FRIENDLY FIRE	1%	1%	1%	5%
ENEMY ACTION	43%	55%	45%	20%

Table (1): Battle & Non-battle Casualties, including long buildup and short combat action times.[60]

Risk Management Step	Amplification
Step 1: Identify Hazard	Identify the hazards that affect forces for each COA selected.
Step 2: Assess Hazard	Evaluate the Hazard in terms of Probability and severity. Probability is the likelihood of the hazard occurring and severity is the degree to which forces would be affected if the damage did occur.
Step 3: Identify Risk Controls	Identify human measures that can be undertaken to reduce the probability or severity of a hazard occurring.
Step 4: Make a risk Decision	Implement the selected risk controls.
Step 5: Monitor Controls during execution	Execute the course of action and observe areas where significant risk has been abated to ensure risk controls are effective.

Table (2): Risk Management Process

Table (3): List of Hazards by Category

Planning Phase	Table (3): List of Hazards by Category
Mission Receipt	**Preliminary Risks**
Mission Analysis	**Operational Factors** **Time:** Preparation Time, Duration of Enemy Action, Warning Time, Decision Cycle, Planning Time, Mobilization Time, Reaction Time, Deployment Time, Concentration Time, Time to Prepare and Complete Maneuver, Time to Accomplish Mission, Rate of Advance/Delay, Time to Reinforce, Time to Commit Reserves, Time to Regenerate Combat power, Time for Redeployment, Time to Reconstitute Forces.[61] Time Required to Open Hostilities, Duration of War, Time for Maneuver/Counter maneuver, Time between consecutive Major Operations, Time Required to Master New Weapons, Reaction Time, Warning Time, OODA Loop.[62] **Space:** Military Geography (topography, Oceanography, Population, Urbanization, Size, Weather, Climate, Distances, Shape), Demography, Politics, Diplomacy, Natural Resources, Economy, Agriculture (vegetation, cultivation), Transportation, Telecommunication, Culture, Ideology, Nationalism, Sociology, Science And Technology,[63] Elements (Positions, Base of Operations, Physical Objectives, Decisive Points, Line of Operations, Line of Communications)[64] **Force**: Defense System, Armed Forces, Relative Combat Power of Opposing Forces, Logistics, Combat Efficiency,[65] Reconstitution Ability, Total Manpower Available for Mobilization, Logistical Support and Sustainment, Interoperability, Firepower, Regeneration of Combat Power, Size and Combat Readiness of reinforcements, Size, Mobility and Combat power of reinforcements/strategic reserves, Non-military sources of Power, Organization, Flexibility, Transportation, Mobility, Types of forces, Quality of Weapons and Equipment.[66]
Mission Analysis	**Critical Factors** Friendly/Enemy: Objectives, Critical Strengths, Critical Weaknesses, Critical Vulnerabilities, Decisive Points [67]
COA Development	**Operational Functions** Command and Control, Intelligence, Fires, Logistics, Protection[68]
COA Development	**Principles of War** Objective, Offensive, Mass, Economy of Force, Maneuver, Unity of Command, Security, Surprise, Simplicity[69]
COA Development	**Principles of MOOTW** Objective, Unity of Effort, Security, Restraint, Perseverance, Legitimacy[70]

Planning Pha	Table (4): Risk Identification M	List of Hazards by Category and METT-T			
	Mission	**ENEMY**	**TERRAIN**	**TROOPS**	**TIME**
Mission Receipt	Prelim Risks	Prelim Risks	Prelim Risks	Prelim Risks	Prelim Risks
Mission Analysis Operational Factors Analysis		**Force:** Defense System, Armed Forces, Relative Combat Power of Opposing Forces, Logistics, Combat Efficiency,[71] Reconstitution Ability, Total Manpower Available for Mobilization, Logistical Support and Sustainment, Interoperability, Firepower, Regeneration of Combat Power, Size and Combat Readiness of reinforcements, Size, Mobility and Combat power of reinforcements/strategic reserves, Non-military sources of Power, Organization, Flexibility, Transportation, Mobility, Types of forces, Quality of Weapons and Equipment.[72]	**Space:** Military Geography (topography, Oceanography, Population, Urbanization, Size, Weather, Climate, Distances, Shape), Demography, Politics, Diplomacy, Natural Resources, Economy, Agriculture (vegetation, cultivation), Transportation, Telecommunication, Culture, Ideology, Nationalism, Sociology, Science And Technology,[73] Elements (Positions, Base of Operations, Physical Objectives, Decisive Points, Line of Operations, Line of Communications)[74]	**Force:** Defense System, Armed Forces, Relative Combat Power of Opposing Forces, Logistics, Combat Efficiency,[75] Reconstitution Ability, Total Manpower Available for Mobilization, Logistical Support and Sustainment, Interoperability, Firepower, Regeneration of Combat Power, Size and Combat Readiness of reinforcements, Size, Mobility and Combat power of reinforcements/strategic reserves, Non-military sources of Power, Organization, Flexibility, Transportation, Mobility, Types of forces, Quality of Weapons and Equipment.[76]	**Time:** Preparation, Duration of Enemy Action, Warning , Decision Cycle, Planning, Mobilization, Reaction , Deployment, Time to Prepare and Complete Maneuver, Concentration, Time to Accomplish Mission, Rate of Advance/Delay, Reinforcement, Commit Reserves, Regenerate Combat power, Redeployment, Reconstitute Forces.[77] Open Hostilities, Duration of War, Maneuver/Counter maneuver, Time between consecutive Major Operations, Time Required to Master New Weapons, Reaction, Warning , OODA Loop.[78]
Mission Analysis Critical Factors	Objectives, Decisive Points	Critical Strengths, Critical Weaknesses, Critical Vulnerabilities,[79]		Critical Strengths, Critical Weaknesses, Critical Vulnerabilities,[80]	
COA Development Functions	C2, Intelligence, Fires, Logistics, Protection[81]				
COA Development Principles of War	Objective, Offensive, Mass, Economy of Force, Maneuver, Unity of Command, Security, Surprise, Simplicity[82]				
COA Development Principles of MOOTW	Objective, Unity of Effort, Security, Restraint, Perseverance, Legitimacy[83]				

Table (5): JOPES Deliberate and Crisis Action Planning Process[84]

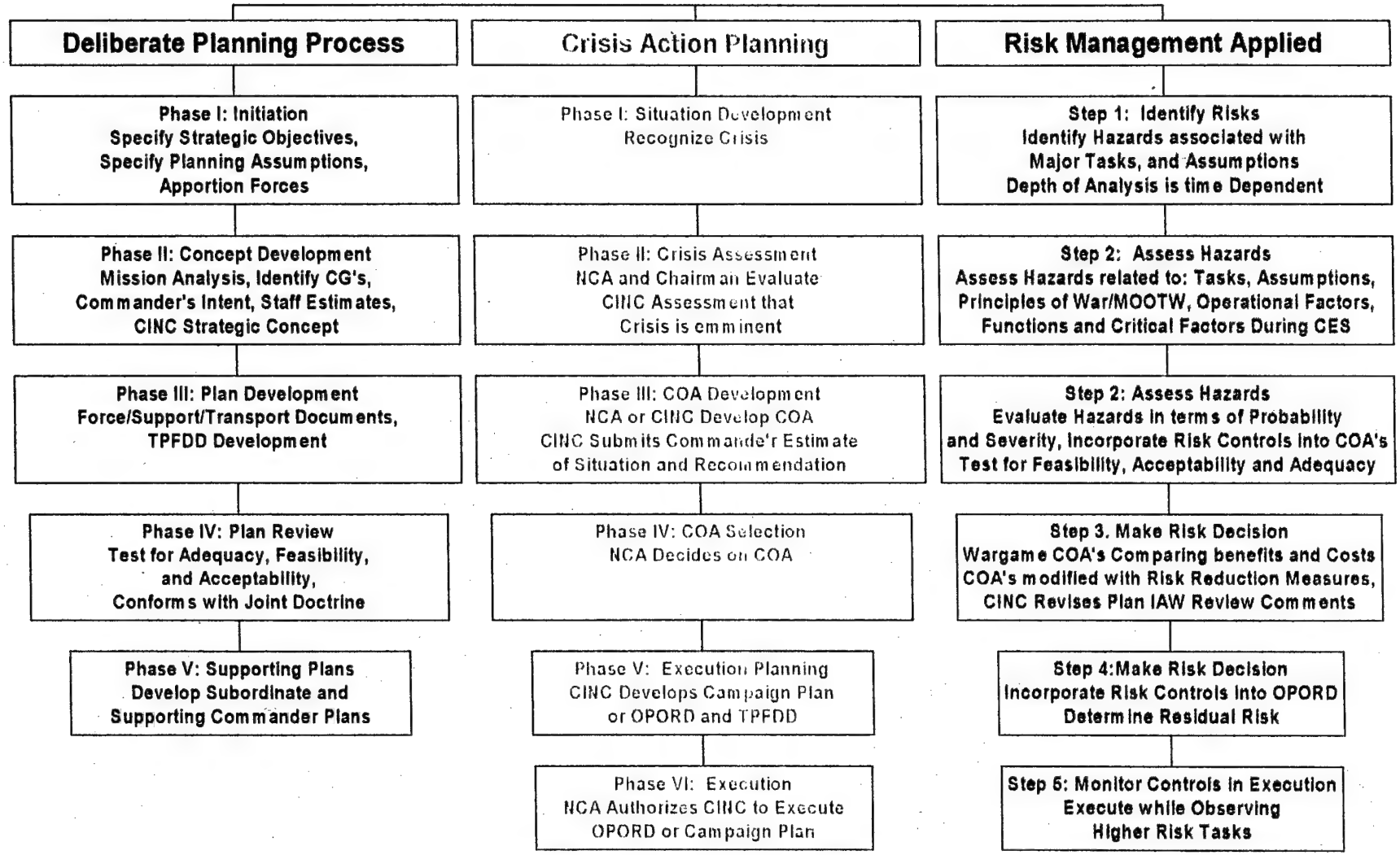

Table (6): Risk Management Merged into the Commander's Estimate of the Situation.

	Risk Management Steps				
CEP Decision Making Process	**Step 1** Identify Hazards	**Step 2** Assess Hazards Determine Risk	**Step 3** Identify Risk Controls & Make Risk Decision	**Step 4** Implement Controls	**Step 5** Execute, Supervise & Evaluate
Mission Receipt	X				
Mission Analysis (Mission, Intent, Objectives, Purpose, Constraints, Restraints, Assumptions) **-Factors Analysis** (Time, Space, Force) **-Adequacy Test**	X	X			
COA Development -Critical Factors (CS,CW,CV,DP) **-Develop ECOAs -Develop COAs** -Operational Functions **-Principles of War/ MOOTW -Feasibility Test -Acceptability Test**	X	X	X		
COA Analysis -COAs vs. ECOAs COA Comparison -Govern Factors -Advantage/Disadvan -Feasible/Acceptable -Merits			X		
COA Approval			X		
Orders Production				X	
Rehearsal				X	X
Execution and assessment				X	X

Note: Grey Shaded blocks represent CES phase of the JTF Planning Process.[85]

Table (7): Hazard Matrix for Falkland-Malvinas Case Study.[86]

Hazard	Type Analysis	Probability	Severity	Total	Risk Decisions
Vulnerability of Carriers to Air attack	Critical Factor	4	4	16	Avoid Stage Carriers East
All 1500 Landing forces on cruise ship Canberra, which has no self-defense and poor fire-fighting capabilities.	Critical Factor	4	5	16	Transfer Crossdeck Landing forces to 3 ships
Air Attack against Surface shipping	Factor	4	3	12	Avoid Move at Night
Blue on Blue engagements	Functions, Principles of War	2	3	6	Control Implement Simple ROE
Base of Operations	Factor	2	3	6	Avoid Stage BOO East
Exocet Missiles fired from Entendards against Shipping	Factor	2	3	6	Control Local Air Superiority
Weather During Amphibious Landing	Factor	2	3	6	Accept
Argentine Submarine Threat	Factor	2	3	6	Avoid Port Stanley Area
Argentine Surface Ship Threat	Factor	2	3	6	Control Judicious Sub Placement
Long Supply Line	Functions	1	4	4	Accept

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Appendix A: Proposed Joint Operational Risk Management Terminology

"Risk Management (RM) Defined

a. Uncertainty and risk are a fundamental part of all military operations. A time-tested tenet of success of the joint operations of the United States is taking bold, decisive action, and a willingness to accept the associated risk. Risk is the probability and severity of loss linked to various hazards. Carefully determining the risks, analyzing and controlling as many hazards as possible, and executing a supervised plan that accounts for these hazards contributes to the success of the application of military force. RM is the process by which decision-makers reduce or offset risk. The RM process provides leaders a systematic mechanism to identify and choose the optimum COA for any given situation. RM must become a fully integrated element of planning and executing an operation. The RM process is applicable to all levels of military operations — strategic, operational, and tactical. Commanders are responsible for the routine application of RM in the planning and execution of military operations."[87] "Risk management is the process of identifying, assessing and controlling risks from operational factors and making decisions that balance risks costs with mission benefits."[88] "Risk management is the recognition that decision making occurs under conditions of uncertainty. Decisions must remain consistent with the commander's stated intent and offer a good expectation of success. The risk taking skill requires competence as a prerequisite."[89]

b. Risk Management Vocabulary

Gamble: taking acceptable risk decisions "without reasonable or prudent assessment or management of the risks involved."[90]

Hazard: a condition with the potential to cause injury, death, property damage or mission degradation.

Operational Risk Management: the process of planning and executing military operations while considering the five steps of risk identification, assessment, decision making, implementing controls and monitoring your decision during execution.

Risk: an expression regarding a hazard or possible loss over a specific period of time or operating cycles expressed in terms of severity and probability.[91]

Risk Assessment: the process of identifying/ detecting hazards and ranking them in terms of severity and probability. It is the first two steps of the risk management process.[92]

Risk Management: The process whereby decisions are made and actions implemented to eliminate or reduce the effects of identified hazards.[93]

Residual Risk: The risk remaining after all risk controls have been implemented

"c. Five Step Risk Management Process

Identify Hazards. Consider all aspects of current and future situations, environment, and known historical problem areas.

Assess Hazards. Assess hazards to determine risks. Assess the impact of each hazard in terms of potential loss and cost, based on probability and severity.

Develop Controls and Make Risk Decisions. Develop control measures that eliminate the hazard or reduce its risk. As control measures are developed, risks are reevaluated until all risks are reduced to an acceptable level.

Implement Controls. Put controls in place that eliminate the hazards or reduce their risks.

Supervise and Evaluate. Enforce standards and controls. Evaluate the effectiveness of controls and adjust and/ or update as necessary."[94]

Hazard Probability Table		
Frequent	5	Occurs very often, will be continuously experienced.
Likely	4	Occurs several times, at a high rate, may be experienced intermittently.
Occasional	3	Occurs sporadically, irregularly, sparsely, may occur sometimes.
Seldom	2	Occurs rarely. Remotely possible, not expected, but might occur at some time.
Unlikely	1	Occurs very rarely. Can assume will not occur, but not impossible.

Table (A1): Hazard Probability Table:[95]

Hazard Severity Table		
Catastrophic	4	(Loss of ___ percent combat power or other MOE). Loss of ability to accomplish the mission or mission failure. Loss of major or mission critical system or equipment. Mission critical security failure. Unacceptable collateral damage.
Critical	3	(Loss of __ percent combat power or other MOE). Significant or severely degraded mission capability or unit readiness. Extensive damage to equipment and systems. Security failure. Significant collateral damage.
Marginal	2	(Loss of __percent combat power or other MOE). Degraded mission capability or unit readiness. Minor damage to equipment or systems. Minor collateral damage times.
Negligible	1	(Loss of __percent combat power or other MOE). Little or no adverse effect on mission capability. Slight equipment or system damage, but fully functional and serviceable. Little or no collateral damage.

Table (A2): Hazard Severity Table.[96]

Risk Assessment Matrix					
	Probability				
Severity	**Frequent(5)**	**Likely (4)**	**Occasional (3)**	**Seldom (2)**	**Unlikely (1)**
Catastrophic (4)	**Extreme**	**Extreme**	**High**	**High**	**Moderate**
Critical (3)	**Extreme**	**High**	**High**	**Moderate**	**Low**
Marginal (2)	**High**	**Moderate**	**Moderate**	**Low**	**Low**
Negligible (1)	**Moderate**	**Low**	**Low**	**Low**	**Low**

Table (A3): Risk Assessment Matrix[97]